# QUARANTINE PASS TRACER SYSTEM

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## ABSTRACT

*This research addressed the gaps encountered by the current contact tracing process used by the Municipality of Candijay as one of the measures to help combat covid-19. The current process starts with the issuance of quarantine passes and listing its details on the logbooks every time a resident passed on a quarantine control point. The problem is that the quarantine passes can be counterfeited, checking the quarantine passes and writing down the details into the logbooks are time consuming and tracking or the whereabouts of a quarantine pass is difficult to trace. The Bohol Quarantine Pass Tracer (QPass Tracer) is a system developed aiming to implement a contact less verification and validation of the issued quarantine passes with the use of QR codes, minimize the extra job done by the front liners in checking the quarantine passes, easily track the whereabouts of the quarantine pass holder, provide data transparency, provide data portability, view real time reports via dashboard. This is also designed to run both online and offline. and a self-made QR reader app which is specially design for QPass Tracer. The system project was carried-out using the agile scrum methodology of software engineering which steps are collecting user stories, project backlogs listings, task scheduling, development, daily stand-up meeting and product delivery. This system was implemented in the Municiplality of Candijay during the lockdown period. The 21 Barangays and the QCP personnel have benefited from the features of the system.*

*Keywords: Tracer System, Quarantine Pass, COVID-19 Response, QR Code, Raspberry pi server, Micro-computer, Web Application, Philippines*

## INTRODUCTION

The corona virus disease (COVID-19) is an infectious disease caused by a newly discovered novel coronavirus. The virus caught the whole world wide open did not spare Bohol from being one of the infected provinces. Since April 2020, the Provincial Government of Bohol has been under enhanced community quarantine and has even extended until April 30, 2020. This has been followed by another community quarantine classification after GCQ. Under Bohol Governor Arthur Yap's executive order, quarantine measures are still implemented as the situations in Metro Manila and in Cebu have yet to stabilize. Currently, there are no specific vaccines or treatments for COVID-19. The province cannot afford to have local transmission of COVID-19, considering that its healthcare facilities are limited and much of the province's lifeblood depends on the tourism sector which has been grounded by the COVID-19

pandemic. To further, local government units (LGUs) should be allowed to modify quarantine rules as they see fit amid the COVID-19 pandemic.

During the implementation of the quarantine measures, every municipality developed their versions of a quarantine pass. This is a response to the memorandum released by the Provincial Government of Bohol that only one person in every household is allowed to go out to buy for necessities and issuance of work passes for those who are working and stricter curfew hours in order to control the spread of the virus and to prevent community transmission.

This works well but concerns some of the concerns arise. The quarantine passes were tampered because it lacks security features. This results in an increase number of persons going outside of their homes like a normal day. With the quarantine passes, an extra job is assigned to the front liners in the Quarantine Control Point (QCP) that is to check, verify and validate quarantine. Some of the QCP personnel are going to collect and even hold the quarantine pass to check it, which is also a risk if the quarantine pass is held by another person except oneself. The current system does not have a full contact tracing system. This will lead to a difficulty to track the whereabouts of a person if ever he/she will be infected by the virus. Matt J Keeling et.al. 2020, said that contact tracing is a central public health response to infectious disease outbreaks, especially in the early stages of an outbreak when specific treatments are limited. Using the current system, the manual checking of quarantine passes does not keep a record of the individuals checked at the QCP.

Robert Hinch et.al. 2020, Digital contact-tracing is being developed in several countries to tackle the SARS-CoV-2 pandemic. Manual contact tracing is too slow to reach people before they transmit. Since the current system does not keep a data, this means that there will be a difficulty in generating reports like the total number of individuals passed in the QCP, the whereabouts (for contact tracing) and more.

Danquah, L. O et.al. 2019, mentioned that the use of mobile devices to support medical and public health practice (mHealth) can improve health outcomes in low-income settings due to the low cost of roll-out, mobility of devices, ease of use and flexible deployment compared with other methods such as computers. Utilizing the existence of technology within our reach is a huge leap for the improvement of the contact tracing process.

This leads the developers to develop Bohol Quarantine Pass Tracer. This system is composed of android application, Raspberry Pi, web application, web portal, web server and database server which functions as one to help the frontliners in their fight against COVID-19. This project works by scanning QR codes using the android application. Next is to Verify and Validate the Quarantine Pass holder using the web portal or in the android mobile application that is specifically designed for this project. During verification and validation, a part of the screen shows the history of the checkpoint areas with specific date and time that the Quarantine Pass holder was previously checked. Lastly, the admin or the authorized personnel will be able to see reports in the dashboard.

## OBJECTIVES OF THE STUDY

This research aimed to develop a Bohol Quarantine Pass Tracer and sought to fulfill the following specific objectives: 1) To implement a contact less verification and validation of the issued quarantine passes with the use of QR codes; 2) To minimize the extra job done by the front liners in checking the quarantine passes; 3) To easily track the whereabouts of the quarantine pass holder; 4) To provide data transparency; 5) To provide data portability; and 6) To view real time reports via dashboard.

## MATERIALS AND METHOD

### Software Engineering Methodology

This project used Agile methodology for software engineering. It is a methodology by which a team can deal with a task by separating it into phases and including consistent joint effort with stakeholders and constant improvement and iteration at each stage.

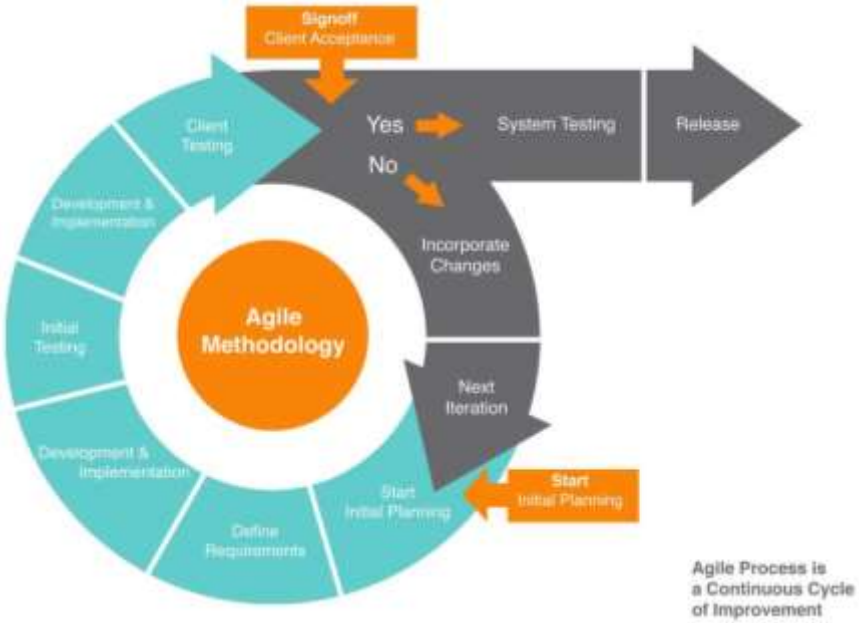


*Figure 1. Agile Methodology*

Each iteration in the agile methodology, design modifications are made and new system features are added. The fundamental thought behind this approach is to build up a project through rehashed cycles called iterations one module at any given sprint.

In this project, the researchers utilized the scrum framework of the agile methodology to further indicate the iterations in the agile methodology as scrum framework provides more specific iterations called sprints before the conceivably shippable product will be discharged to the customer. Scrum enables us to concentrate on conveying the business esteem in the most limited time. It quickly and more than once investigates real working programming. It underlines responsibility, collaboration, and iterative advancement toward a well-characterized objective

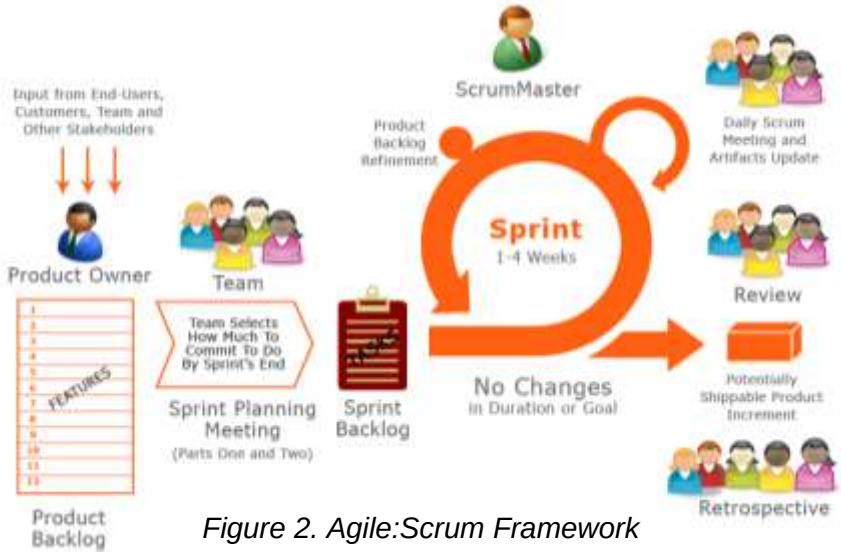


*Figure 2. Agile:Scrum Framework*

The researchers collected information by studying the existing system and conducting an interview to the officer in-charge to identify the gaps and the possible solutions. After the collection of information, the researchers listed all the features that will be implemented and the right amount of man power to do the job at the given amount of time. The progress of the project was monitored daily by the scrum master in a form of standup meetings. To check the potential deliverable product, the researchers presented the project to the Local Government Unit of Candijay.


*Figure 3. Project Presentation with the Municipality of Candijay Key Officials*

All of the recommendations were undertaken and presented again for another review. The series of sprints allowed the team to come up with a fully shippable product which was immediately implemented by the LGU as one of the major tools to help combat covid-19. In order to do the full-blown implementation, the researchers tapped with other Colleges, Barangay Health Workers, Brgy. Captains and other entities that can be mobilized for registration of household heads and the distribution of QR Code stickers to the residents. After all of the undertakings, the project has been rolled out at the major quarantine control points of Candijay. Figure 4 shows the photo opportunity with the Sanguniang Bayan, MDRRMC, BFP, PNP Personnel, Health Workers, Taskforce Disiplina and Barangay Tanods.

*Figure 4. Project Rollout*

## RESULTS AND DISCUSSION

### 1. Mobile Application Screen

During the rollout of the project, the system starts to return data according to its purpose. Every bit of the data is stored in the database and filtered as information for the reports which can be printed or not. Figure 5 shows the mobile application screen that is used to scan the QR codes. If the QR code scanned corresponds a data in the database, it will be displayed in the screen together with other related information such as the alternate quarantine pass holder, address, time, and date that QR code last scanned and the checkpoint history.


*Figure 5. Mobile Application Screen*

## 2. Dashboard

Figure 6 displays the dashboard that shows the reports like the total number of residents registered, the percentage of residents went out and passed the Quarantine Control Point (QCP), the number of QR codes scanned, display specific QCP where the resident's QR code has been scanned, Printing of reports and more relevant features.


*Figure 6. Dashboard*

With the information from the database that were displayed in the dashboard and in the mobile application, the in-charge in the QCP will be able to filter the unauthorized residents from going out. It is because the validity and authenticity of the quarantine passes will be identified. The system also returns the actual QCP that a quarantine pass has been scanned. This means that the contact tracers will be able to identify all of the QCPs where a specific resident passed. Furthermore, the system has eliminated the counterfeit quarantine passes.

## 3. Features of Quarantine Pass Tracer System

### 3.1 Contact less verification and validation of the issued quarantine passes on the use of QR codes

Using the newly developed system scans the QR codes attached in the quarantine passes, car windshields, helmets, side mirrors or even in the motorcycle cowlings. After scanning the QR codes, the resident information will appear in the mobile application for verification and validation.

### 3.2 Minimize the extra job by the front liners in checking the quarantine passes

The process of scanning the QR codes minimizes the extra job done by the front liners assigned in quarantine control points (QCP) because the residents won't bother anymore giving the quarantine pass, identification cards and other documents for verification and validation.

### 3.3 Track the whereabouts of the quarantine pass holder

After scanning the QR codes, the QCP location where the residents' QR were scanned will be recorded in the database. Whenever the data is needed, it will be fetched from the database and be displayed as readable information.

### 3.4 Data transparency and portability

Every piece of data gathered from the QCPs was recorded in the database. Whenever the data is needed, only the authorized person can easily display the information and print reports. The system does not allow removing of any data from the QCPs because those are vital for the effectiveness of the system.

### 3.5 Data portability

The system and its database are hosted online. This allows the whole system to be accessed almost anywhere as long as the internet connection is available. In the QCPs where internet connection is not available, the data is stored in the local memory and be sent to the server via over the air update (OTA).

### 3.6 Real time reports via dashboard.

Dashboards display all the information needed by the system administrators. In Bohol Quarantine Pass Tracer, the dashboard displays

the real-time number of Quarantine Pass QR codes scanned, the total number of Quarantine Pass QR codes scanned in the day, the total number of QCPs, Total number of enforcers, real-time QR logs, the total number of registered residents in the system, Monthly reports and more. This allows the administration to monitor the data closely.

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## CONCLUSIONS

Contact tracing is one of the vital strategies to help combat Covid-19. With a system and the right amount of data, contact tracing will be easier and fast. Bohol Quarantine Pass Tracer is capable of holding vast amount of data and runs on both online and offline platforms. Within the GCQ implementation, the system has been proven to be as useful as it was designed for, and it gives comfort to the personnel in QCPs and other implementers. The failure of a contact tracing system is a great loss to the battle against covid-19 and may cause greater damage to the citizens, the economy and the country.

## RECOMMENDATIONS

The LGU Candijay should provide more QCPs in order to record more QCP location in each of the quarantine pass holders for the contact tracing to be more accurate. The continuous use of the system as long as it is applicable will be very helpful in collecting data for an effective contact tracing effort.

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